# Lessons Learned from Development and Teaching of a Short Course in Statistical Quality Control for Measurement Uncertainty

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# What we wanted and expected

- Full management support (we had it.)
- Train 150 test engineers and technicians in statistical thinking and the use of SQC for evaluation and control of measurement processes. (Methods developed by NBS/NIST for cal labs)
- Each facility (wind tunnel) create and implement its own SQC processes for measurement, faithfully adhere to those processes, and use SQC charts to evaluate and control them.
- Turn over management of the SQC process to the Facility Managers (9).

# The format

- 24 hours of in-class instruction over 4 days.
- Lots of statistical control chart examples.
- Several hands-on lab exercises with instrumentation.

# What happened

- It took 6 months to develop the course and another 3 months to make a major revision.
- Most of the students were prisoners, a few opted to be vacationers and a very small number became converts (<4%).
- Training took five months starting in January 1999.
- By January 2000, it was clear that the data quality assurance process was almost entirely not working. We had to acquire control of all of the significant SQC processes.
- After the course, no one other than the trainer felt capable of making the control charts and interpreting them.
- For now, the data quality assurance project is a research project controlled by me. Its primary function is to characterize the measurement processes.

# Lessons learned

- We bit off too much and moved too fast. Let people get used to the ideas.
- Statistical thinking is very tough to get across even if the methods are relatively simple. It is a paradigm shift for anyone not brought up on it, including most engineers.
- But four years later, a few people are noticing the value.
- Never teach prisoners. Find another way to make it work.
- Don’t attempt to combine education and training.
- Plan on being in it for the long haul.
- If you keep addressing people’s concerns, eventually things will turn around and the tide will shift (one data point).

# Epilogue

- I only teach the course to institutions new to the ideas.
- We hire SQC pros to teach statistical thinking and control chart methods.
- Four institutions are now using the methods (other than NIST cal labs): numerous facilities at NASA Langley, one facility at Boeing, several facilities at NASA Glenn, the SRM test division of Thiokol.